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EXAMINER	
FRANKLIN, RICHARD B	
ART UNIT	**PAPER NUMBER**
2181	

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/735,428	NELLITHEERTHA, HARIPRASAD	
	Examiner	Art Unit	
	Richard Franklin	2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/12/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1 – 18 have been examined.

Drawings

2. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3, 4, 8, 9, 10, and 14 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 3 recites the limitation "the group of heuristics" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "the group of heuristics" to refer to "a group" of heuristics.

5. Claim 4 recites the limitation "the group of schedulers" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "the group of schedulers" to refer to "a group" of schedulers.

6. Claim 8 recites the limitation "said table" in line 10 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "said table" to refer to "a table" of desired operating heuristics.

7. Claim 9 recites the limitation "the group of heuristics" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "the group of heuristics" to refer to "a group" of heuristics.

8. Claim 10 recites the limitation "the group of schedulers" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "the group of schedulers" to refer to "a group" of schedulers.

9. Claim 14 recites the limitation "the group of heuristics" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

The Examiner has interpreted the limitation "the group of heuristics" to refer to "a group" of heuristics.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1 – 6, and 11 – 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Ofer et al. US Patent No. 6,904,470 (hereinafter Ofer).

As per claims 1 and 5, Ofer teaches an input/output (I/O) scheduler in a computing system that maps each of a plurality of I/O schedulers against a corresponding desired set of heuristics (Figures 6, 8, and 10, Col 9 Lines 8 – 28); monitoring heuristics relating to job requests performed in the computing system (Figure 6, Col 9 Lines 8 – 28); and determining whether the monitored heuristics match and of the desired sets of heuristics to select one of the plurality of I/O schedulers (Figures 6, 8, and 10, Col 7 Lines 17 – 19).

As per claim 2 and 13, Ofer teaches selecting a default I/O scheduler (read sub-scheduler) from the plurality of I/O schedulers when the monitored heuristic does not match a set of desired heuristics (Col 8 Line 66 – Col 9 Line 7).

As per claim 3, Ofer teaches wherein the monitored heuristic is the proportion of read requests to write requests (Figure 5, Col 7 Lines 40 – 46).

As per claim 4, Ofer teaches wherein at least one of the I/O schedulers is a Fairness Queue (Round Robin) scheduler (Figure 3 Item 70, Col 4 Lines 56 – 67).

As per claim 6, Ofer teaches an input/output (I/O) scheduler in a computing system that has a means for monitoring heuristics of jobs performed in the computing system (Figure 6, Col 9 Lines 8 – 28); a means for comparing the monitored heuristics with a desired set of heuristics associated with each of the plurality of I/O schedulers to determine a preferred one of the I/O schedulers (Figures 6, 8, and 10, Col 7 Lines 17 – 19); and a means for activating the preferred I/O scheduler (Figure 6 Items 165 and 180).

As per claim 11, Ofer teaches a means for maintaining a predetermined set of values associated with a plurality of I/O schedulers (Figures 5, and 7 – 10); means for monitoring heuristics associated with jobs performed in the computing system (Figure 6, Col 9 Lines 8 – 28); and means for comparing the monitored heuristics with the predetermined set of values to select one of the plurality of I/O schedulers (Figure 6, 8, 10, Col 7 Lines 17 – 19).

As per claim 12, Ofer teaches a means for activating the selected I/O scheduler (Figure 6 Items 165 and 180).

As per claim 14, Ofer teaches wherein the monitored heuristic is the proportion of read requests to write requests (Figure 5, Col 7 Lines 40 – 46).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 7 – 10, and 15 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofer et al. US Patent No. 6,904,470 as applied to claims 1 – 6, and 11 – 14 above in view of Structured Computer Organization Second Edition by Andrew S. Tanenbaum (hereinafter Tanenbaum).

As per claim 7, Ofer teaches that the means for activating the preferred I/O scheduler is a hardware element in the computer system (Ofer; Figure 6 Items 165 and 180, Col 9 Lines 22 – 25).

Ofer does not teach wherein the means for activating the preferred I/O scheduler is a kernel daemon.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the I/O scheduling means in the operating systems kernel.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

As per claim 8, Ofer teaches an application (Ofer; Col 3 Lines 52 – 56); a plurality of I/O schedulers (Ofer; Figure 3 Items 64, 66, 68, and 70); mapping the plurality of I/O schedulers against a corresponding desired set of operating heuristics (Ofer; Figures 6, 8, and 10, Col 9 Lines 8 – 28); and gathering and analyzing heuristics relating to job requests submitted by the application and selecting one of the I/O schedulers based on the analyzed heuristics and the desired set of operating heuristics in a table (Ofer; Figures 6, 8, 10, Col 9 Lines 8 – 28).

Ofer does not teach wherein an operating system kernel gathers and analyzes heuristics relating to job requests submitted by the application and selects one of the I/O schedulers based on the analyzed heuristics and the desired set of operating heuristics in a table.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the means for gathering and analyzing heuristics relating to job requests submitted by the application and selecting one of the I/O schedulers based on the analyzed heuristics and the desired set of operating heuristics in a table in an operating system kernel.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

As per claim 9, Ofer as modified by Tanenbaum teaches wherein the analyzed heuristic is the proportion of read requests to write requests (Ofer; Figure 5, Col 7 Lines 40 – 46).

As per claim 10, Ofer as modified by Tanenbaum teaches wherein at least one of the I/O schedulers is a Fairness Queue (Round Robin) scheduler (Ofer; Figure 3 Item 70, Col 4 Lines 56 – 67).

As per claim 15, Ofer teaches wherein the activating means is a hardware device in the computer system (Ofer; Figure 3 Item 60).

Ofer does not teach wherein the activating means is a daemon.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the activating means as a daemon.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

As per claim 16, Ofer teaches an operating system module (Ofer; Figure 1 Item 24); an I/O scheduling module having an active I/O scheduler selected from a plurality of I/O schedulers (Ofer; Figure 3 Item 60); a hardware device drivers module for executing job requests received from the operating system module via the I/O scheduling module (Ofer; Figure 1 Item 16, Col 3 Lines 31 – 41); a heuristics module for analyzing information returned from the hardware device drivers module relating to the executed job (Ofer; Figure 3 Item 53); a switch module for comparing the analyzed information with a predetermined set of values to select a preferred one of the plurality of I/O schedulers (Ofer; Figure 3 Item 62, Figure 6, Col 7 Lines 17 – 19, Col 9 Lines 8 – 28); and a switching mechanism for switching the active I/O scheduler in the I/O scheduling module to the preferred I/O scheduler (Ofer; Figure 3 Item 62).

Ofer does not teach a wherein the switching mechanism is a kernel thread.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the switching means as a kernel thread.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

As per claim 17, Ofer teaches an (I/O) scheduler in a computing system that maps each of a plurality of I/O schedulers against a corresponding desired set of heuristics (Ofer; Figures 6, 8, and 10, Col 9 Lines 8 – 28); monitoring heuristics relating to job requests performed in the computing system (Ofer; Figure 6, Col 9 Lines 8 – 28); and determining whether the monitored heuristics match and of the desired sets of heuristics to select one of the plurality of I/O schedulers (Ofer; Figures 6, 8, and 10, Col 7 Lines 17 – 19).

Ofer does not teach wherein the mapping means, monitoring means, and determining means are implemented in computer program code.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the mapping means, monitoring means, and determining means in computer program code

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

As per claim 18, Ofer teaches a means for monitoring heuristics of job requests performed in the computing system (Ofer; Figure 6, Col 9 Lines 8 – 28); and means for comparing the monitored heuristics with a desired set of heuristics to select one of the plurality of I/O schedulers (Ofer; Figure 6, 8, 10, Col 7 Lines 17 – 19).

Ofer does not teach wherein the monitoring means and comparing means are implemented in computer program code.

Tanenbaum teaches wherein software and hardware are logically equivalent (Tanenbaum; Page 11 Lines 4 – 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer to implement the monitoring means and comparing means in computer program code

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Ofer by the teachings of Tanenbaum because implementing functions in software and not hardware addresses considerations such as cost, speed, reliability, and frequency of expected changes (Tanenbaum; Page 11 Lines 10 – 18).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Franklin whose telephone number is (571) 272-0669. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on (571) 272-4083. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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